



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**Docket No.: FAA-2010-0310; Amdt. No. 25-135**

**RIN 2120-AJ72**

**Harmonization of Various Airworthiness Standards for Transport Category**

**Airplanes—Flight Rules**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** This rule amends the regulations governing various airworthiness standards for transport category airplanes. This action harmonizes the requirements for takeoff speeds, static lateral-directional stability, speed increase and recovery characteristics, and the stall warning margin for the landing configuration in icing conditions with the European Aviation Safety Agency (EASA) certification standards.

**DATES:** This amendment becomes effective [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**FOR FURTHER INFORMATION CONTACT:** For technical questions concerning this action, contact Don Stimson, Federal Aviation Administration, Airplane & Flight Crew Interface Branch, ANM-111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW, Renton, WA 98057-3356; telephone (425) 227-1129; facsimile (425) 227-1149, e-mail [Don.Stimson@faa.gov](mailto:Don.Stimson@faa.gov).

For legal questions concerning this action, contact Doug Anderson, Federal Aviation Administration, Office of the Regional Counsel (ANM-7), 1601 Lind Avenue SW, Renton, Washington 98057-3356; telephone (425) 227-2166; facsimile (425) 227-1007; e-mail [Douglas.Anderson@faa.gov](mailto:Douglas.Anderson@faa.gov).

**SUPPLEMENTARY INFORMATION:**

**Authority for this Rulemaking**

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General requirements." Under that section, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing regulations and minimum standards for the design and performance of aircraft that the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority. It prescribes new safety standards for the design and operation of transport category airplanes.

## List of Abbreviations and Acronyms Used In This Document

<b>Term</b>	<b>Definition</b>
$V_R$	rotation speed
$V_1$	the maximum speed in the takeoff at which the pilot must take the first action (e.g., apply brakes, reduce thrust, deploy speed brakes) to stop the airplane within the accelerate stop distance. $V_1$ also means the minimum speed in the takeoff, following a failure of the critical engine at $V_{EF}$ , at which the pilot can continue the takeoff and achieve the required height above the takeoff surface within the takeoff distance.
$V_2$	takeoff safety speed
$V_{EF}$	speed at which the critical engine is assumed to fail during takeoff
$V_{REF}$	reference landing speed
$V_{SW}$	speed at which the onset of natural or artificial stall warning occurs
$V_{SR}$	reference stall speed
$V_{SR1}$	reference stall speed in a specific configuration
$V_{LOF}$	lift-off speed
$V_{MU}$	minimum unstick speed
$V_{MC}$	minimum control speed with the critical engine inoperative
$V_{FE}$	maximum flap extended speed
$V_{LE}$	maximum landing gear extended speed
$V_{FC}/M_{FC}$	maximum speed for stability characteristics
$V_{MO}/M_{MO}$	maximum operating limit speed
$V_{DF}/M_{DF}$	demonstrated flight diving speed

<b>Acronym</b>	<b>Definition</b>
ALPA	Air Line Pilots Association
ARAC	Aviation Rulemaking Advisory Committee
EASA	European Aviation Safety Agency
GAMA	General Aviation Manufacturers Association
ICAO	International Civil Aviation Organization
NPRM	Notice of Proposed Rulemaking
RFA	Regulatory Flexibility Act
SBREFA	Small Business Regulatory Enforcement Fairness Act

## Overview of Final Rule

This rulemaking harmonizes specific airworthiness certification standards for transport category airplanes with those of the European Aviation Safety Agency (EASA). Harmonizing these airworthiness standards reduces certification costs to airplane manufacturers and improves product performance and capability for operators while increasing the level of safety.

During certification, applicants for a type certificate must determine at what speed a pilot begins rotating the airplane to the liftoff pitch attitude during the takeoff roll. This speed ( $V_R$ ) must be fast enough to provide a safe speed margin between the resulting liftoff speed ( $V_{LOF}$ ) and the minimum safe liftoff speed, also known as the minimum unstick speed ( $V_{MU}$ ). This rule allows the speed margin between  $V_{LOF}$  and  $V_{MU}$  to be reduced, and hence  $V_R$  to be reduced, for airplanes where the minimum value of  $V_{MU}$  is limited by the geometry of the airplane (i.e., ground contact of the tail of the airframe with the runway when the airplane is rotated to the takeoff pitch angle). Because the geometry of the airplane provides protection against early or over-rotation beyond the safe liftoff pitch attitude at or near  $V_{MU}$ ,  $V_R$  can be reduced without lowering the level of safety. Reducing  $V_R$  reduces the takeoff distance needed at the same weight or allows a higher weight (e.g., capability to carry more payload or fuel) at the same takeoff distance.

The static lateral-directional stability requirements are amended to reinstate the standards that existed prior to Amendment 25-72 that treat the specific lateral and directional stability requirements as separate entities.

This final rule also adds a requirement that, when conducting the sideslip tests required by § 25.177(c), the sideslip angles evaluated must include those resulting from

applying at least one-half of the available rudder control, but no more than 180 pounds of force. For sideslip angles greater than those appropriate to the operation of the airplane, up to the angle achieved using a full rudder control input or a rudder control force of 180 pounds, this rule reduces the range of speeds and power settings that must be evaluated. The reduced scope of the evaluation will lower flight test safety risks as well as harmonize and standardize current practices.

The final rule adds requirements for minimum roll capability that a transport category airplane must have and for airplane flight characteristics following extension of speedbrakes at high speeds. The new requirements are:

(1) There must be adequate roll capability to assure a prompt recovery from a lateral upset condition, and

(2) Speedbrake extension at high speed must not result in an excessive positive load factor when the pilot does not act to counteract the effects of the extension.

Extending the speedbrakes at high speed also must not cause --

- (a) Buffeting that would impair the pilot's ability to read the instruments, or
- (b) A tendency for the airplane to pitch down, which could cause a further increase in speed, unless the pitching moment is small.

Lastly, this rule adds a requirement that the non-icing stall warning requirements prescribing the speed at which stall warning must begin ( $V_{SW}$ ) also apply to icing conditions when the airplane is in the landing configuration.

## **Background**

### **Harmonization**

Part 25 prescribes airworthiness standards for type certification of transport category airplanes for products certificated in the United States (U.S.). EASA Certification Specifications for Large Aeroplanes (CS-25) prescribe the corresponding airworthiness standards for products certificated in Europe. While part 25 and CS-25 are similar, they differ in some areas.

The FAA tasked the Aviation Rulemaking Advisory Committee (ARAC) to review existing regulations and recommend changes to eliminate differences between part 25 and CS-25 performance and handling characteristic standards by harmonizing to the higher standards. This rule is a result of that harmonization effort.

#### Summary of the NPRM

The FAA published a notice of proposed rulemaking (NPRM) in the Federal Register on November 19, 2010 (75 FR 70854). The proposal discussed changes to part 25 in four areas:

1. Selection of the takeoff rotation speed,
2. Static lateral-directional stability,
3. Roll capability and extension of speedbrakes at high speeds, and
4. Stall warning onset speed for the landing configuration in icing conditions.

Three of the four proposed changes respond to the ARAC recommendations and EASA's actions in response to those recommendations. The fourth, pertaining to the stall warning onset speed for the landing configuration in icing conditions, responds to an action taken by EASA regarding a public comment made during the harmonized rulemaking that led to adoption of Amendment 121 to part 25 and Amendment 3 to CS-25. The comment period closed February 17, 2011.

## General Overview of Comments

The FAA received comments from Airbus, the Boeing Company, the Cessna Aircraft Company, the General Aviation Manufacturers Association (GAMA), and the Air Line Pilots Association, International (ALPA). ALPA provided a general comment in support of the proposed changes. None of the commenters opposed the proposed changes.

## **Discussion of Public Comments and Final Rule**

Boeing questioned the wording of proposed § 25.177(c), which was taken directly from EASA's CS 25.177(c) and requires application of at least 180 pounds of force to the rudder control to show compliance. Boeing believes the intent is to require a control input of at least one-half the available rudder control, but no more than 180 pounds of pedal force. Airbus commented that there is no need to consider a rudder control input beyond that corresponding to the maximum commanded sideslip angle for the current flight conditions, even if it is lower than one-half of the maximum possible displacement of the rudder pedal control input.

We agree. The language in the final rule reflects the original intent (as described in Boeing's comment) of the proposed § 25.177(c). We notified EASA that the wording of CS 25.177(c) is in error and confirmed it will be corrected.

We also agree with the Airbus interpretation of the requirement. We recognize there is no need to apply more rudder control input than that which results in the maximum available sideslip, even if that control input is less than one-half of the maximum possible displacement of the rudder pedal control. This can occur due to a rudder travel limiting system or other feature of the airplane's flight control system.

Further rudder control input would not result in additional sideslip, and therefore would not affect compliance with the rule.

Airbus also commented on proposed § 25.21(g)(1) to require the stall warning requirements of § 25.207(c) and (d) to be met in icing conditions for the landing configuration. Airbus noted that special conditions are used to identify appropriate safety standards for Airbus fly-by-wire airplanes that have high incidence protection features as part of their flight control system design. These special conditions include requirements used in lieu of § 25.207. We anticipate that special conditions will continue to be used in lieu of § 25.207 to provide an equivalent level of safety to that established in the regulations.

Except for the change to § 25.177(c), in response to the Boeing comment discussed above, a minor clarifying addition to § 25.177(a), and correcting errors in the references to § 25.147(f) in §§ 25.253(b) and (c) noted in comments by Cessna and GAMA, this final rule is adopted as proposed.

## **Regulatory Notices and Analyses**

### **Regulatory Evaluation**

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Public Law 96-354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Public Law 96-39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign



commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of \$100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impact of the final rule.

Department of Transportation Order DOT 2100.5 prescribes policies and procedures for simplification, analysis, and review of regulations. If the expected cost impact is so minimal that a proposed or final rule does not warrant a full evaluation, this order permits that a statement to that effect and the basis for it be included in the preamble if a full regulatory evaluation of the costs and benefits is not prepared. Such a determination has been made for this final rule.

The reasoning for this determination follows: The final rule will amend §§ 25.21(g)(1), 25.107(e)(1)(iv), 25.177, and 25.253 to harmonize with EASA requirements already in CS-25. A review of current practice of U.S. manufacturers of transport category airplanes has revealed the manufacturers intend to fully comply with the EASA standards (or are already complying) as a means of obtaining joint certification. Since future certificated transport category airplanes are expected to meet the existing CS-25 requirements and this final rule will simply adopt the same requirements, the manufacturers will incur no additional costs. The final rule will

provide benefits from reduced joint certification costs from the harmonization itself, and for the parts of the rule harmonizing with less stringent EASA requirements, manufacturers can expect additional benefits inherent in the reduced stringency. The FAA, therefore, has determined that this final rule will have no costs, and positive benefits, and does not warrant a full regulatory evaluation. We discuss the basis for our findings below.

The FAA has also determined that this final rule is not a “significant regulatory action” as defined in section 3(f) of Executive Order 12866, and is not “significant” as defined in DOT's Regulatory Policies and Procedures.

#### **Who is Potentially Affected by This Rulemaking?**

Manufacturers of transport category airplanes

#### **Costs and Benefits of This Rulemaking**

##### **Cost and Benefits of Amendment to § 25.21(g)(1)**

For this amendment we are adopting an EASA requirement that has no counterpart in the current CFR. Manufacturers’ compliance with the EASA requirement increases the safety of their airplanes. However, since the manufacturers are already complying (or intend to comply) with the EASA requirement, there will be no additional safety benefits from compliance with the harmonizing amendment.

As we are adopting an EASA requirement that has no counterpart in the current CFR, this action will not reduce certification costs, which include costs of data collection and analysis, paperwork, and time spent applying for and obtaining approval from the regulatory authorities. Since the manufacturers intend to comply with the EASA

requirement, however, they will incur no additional costs to comply with the FAA harmonizing amendment.

#### Costs and Benefits of Amendment to § 25.107(e)(1)(iv)

Manufacturers will benefit as a result of reduced certification costs from the harmonization of § 25.107(e)(1)(iv) with CS 25.107(e)(1)(iv). These benefits will result because the amendment is a less stringent requirement that will reduce the required minimum takeoff speed for geometry-limited (viz., tail contact with the runway) airplanes. As discussed in the NPRM, since the minimum takeoff speed is, in part, intended to reduce the probability of an airplane reaching a takeoff pitch attitude beyond that shown to be safe, the additional protection against such a condition inherent in a geometry-limited airplane allows the minimum takeoff speed to be safely reduced. The less stringent requirement implies higher takeoff weights, increases in payload, and shorter takeoff distances for geometry-limited airplanes. These are operator benefits, much of which will accrue to part 25 airplane manufacturers by increasing airplane value.

As this amendment is relieving, there will be no increase in costs.

#### Costs and Benefits of Amendment to § 25.177

Section 25.177(a) and (b) (requiring separate directional and lateral stability assessments) were removed by Amendment 25-72, published in the Federal Register (55 FR 29756), July 20, 1990. The FAA considered them unnecessary since directional and lateral stability could be determined using an “alternative test” based on data obtained in showing compliance with § 25.177(c). EASA’s retention of CS 25.177(a) and (b), however, allows manufacturers to use the “basic test” outlined by CS 25.177(a) and (b). Reinstatement of § 25.177(a) and (b) will lower certification costs for manufacturers

preferring instead to use the “basic test.” Transport category airplane manufacturers preferring to satisfy the stability requirements with the “alternative test” of § 25.177(c) will face no increase in cost since they may still use that test. In any case, since manufacturers intend to comply with CS 25.177(a) and (b), they will incur no additional costs from complying with the harmonizing amendment regardless of the cost situation.

Compared to the current § 25.177(c) and (d), CS 25.177(c) and (d) have both more stringent and less stringent requirements. As discussed in the NPRM, the less stringent requirement will increase the safety of flight tests without reducing test validity. Compliance with the more stringent requirement will entail some certification costs and, as noted in the NPRM, reduce payload-carrying capability under certain conditions. However, since the manufacturers intend to comply with CS 25.177(c) and (d) (or are already complying), they will incur no additional costs to comply with the harmonizing amendment.

#### Costs and Benefits of Amendment to § 25.253

Manufacturers will benefit as a result of reduced certification costs from the harmonization of § 25.253 with CS 25.253. Compliance of manufacturers with the more stringent EASA requirements will also increase the safety of their airplanes. However, the manufacturers intend to comply with the EASA requirements (or are already complying). So, there will be no additional safety benefits from compliance with the FAA harmonizing amendment.

Transport category airplane manufacturers will face additional certification costs--especially additional flight testing costs--to meet the EASA requirements. Since the

manufacturers intend to comply with the EASA requirements, however, they will incur no additional costs to comply with the FAA harmonizing amendment.

#### Summary of Costs and Benefits

The benefits of an FAA rule harmonizing with a more stringent EASA rule necessarily flow from reduced certification costs brought about by the harmonization itself. Just as any costs are attributable to complying with the existing EASA rule, so too are any benefits from increased safety. Accordingly, the benefits of the more stringent §§ 25.21(g)(1), 25.253, 25.177(a) and (b), and the more stringent parts of § 25.177(c) and (d) will be reduced certification costs from harmonization.

For an FAA rule harmonizing with a less stringent EASA rule, there will be reduced certification costs from the harmonization itself, but also benefits inherent in the reduced stringency. For § 25.107(e)(1)(iv), the inherent benefits will be higher takeoff weights, increases in payload, and shorter takeoff distances for geometry-limited airplanes allowed by the reduced minimum takeoff speeds. For the less stringent parts of § 25.177(c) and (d), the inherent benefits will be the increase in test flight safety brought about by the less stringent requirement.

As no commenters have disputed this same rationale used in the NPRM, the FAA has determined that this final rule will have minimal costs with positive net benefits and does not warrant a full regulatory evaluation.

#### Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Public Law 96-354) (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational

requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.” The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA. However, if an agency determines that a rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

As noted above, this final rule will not entail any additional costs to transport category airplane manufacturers as they are already in compliance, or intend to fully comply, with more stringent EASA standards. Moreover, all U.S. manufacturers of transport category airplanes exceed the Small Business Administration small-entity criteria of 1,500 employees. We received no comments on our determination in the NPRM of no significant economic impact.

Therefore as the FAA Administrator, I certify that this rule will not have a significant economic impact on a substantial number of small entities.

International Trade Impact Assessment

The Trade Agreements Act of 1979 (Public Law 96-39), as amended by the Uruguay Round Agreements Act (Public Law 103-465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this final rule and determined that it will promote international trade by harmonizing with corresponding EASA regulations thus reducing the cost of joint certification.

#### Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of \$100 million or more (adjusted annually for inflation with the base year 1995) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a “significant regulatory action.” The FAA currently uses an inflation-adjusted value of \$143.1 million.

This final rule does not contain such a mandate. The requirements of Title II do not apply.

#### Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. The FAA has determined that there is no new requirement for information collection associated with this final rule.

#### International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these regulations.

#### Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 312d and involves no extraordinary circumstances.

#### Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the FAA, when modifying its regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. In the NPRM, the FAA requested comments on whether the proposed rule should apply differently to intrastate operations in Alaska. The agency did not receive any comments, and has



determined, based on the administrative record of this rulemaking, that there is no need to make any regulatory distinctions applicable to intrastate aviation in Alaska.

## **Executive Order Determinations**

### Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. The agency determined that this action will not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, does not have Federalism implications.

### Executive Order 13211, Regulations that Significantly Affect Energy Supply,

### Distribution, or Use

The FAA analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it is not a “significant energy action” under the executive order and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

## **How to Obtain Additional Information**

### Rulemaking Documents

An electronic copy of a rulemaking document may be obtained by using the Internet —

1. Search the Federal eRulemaking Portal (<http://www.regulations.gov>);
2. Visit the FAA’s Regulations and Policies Web page at [http://www.faa.gov/regulations\\_policies/](http://www.faa.gov/regulations_policies/) or

3. Access the Government Printing Office's Web page at

<http://www.gpo.gov/fdsys/>

Copies may also be obtained by sending a request (identified by notice, amendment, or docket number of this rulemaking) to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW, Washington, DC 20591, or by calling (202) 267-9680.

#### Comments Submitted to the Docket

Comments received may be viewed by going to <http://www.regulations.gov> and following the online instructions to search FAA-2010-0310 for this action. Anyone is able to search the electronic form of all comments received into any of the FAA's dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.).

#### Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document, may contact its local FAA official, or the person listed under the FOR FURTHER INFORMATION CONTACT heading at the beginning of the preamble. To find out more about SBREFA on the Internet, visit

[http://www.faa.gov/regulations\\_policies/rulemaking/sbre\\_act/](http://www.faa.gov/regulations_policies/rulemaking/sbre_act/).

#### **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements, Safety

#### **The Amendment**

In consideration of the foregoing, the Federal Aviation Administration amends chapter I of Title 14, Code of Federal Regulations as follows:

**PART 25-- AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY  
AIRPLANES**

1. The authority citation for part 25 continues to read as follows:

**Authority:** 49 U.S.C. 106(g), 40113, 44701, 44702 and 44704

2. Amend § 25.21 by revising paragraph (g)(1) to read as follows:

**§ 25.21 Proof of compliance.**

\* \* \* \* \*

(g) \* \* \*

(1) Each requirement of this subpart, except §§ 25.121(a), 25.123(c), 25.143(b)(1) and (2), 25.149, 25.201(c)(2), 25.239, and 25.251(b) through (e), must be met in icing conditions. Section 25.207(c) and (d) must be met in the landing configuration in icing conditions, but need not be met for other configurations. Compliance must be shown using the ice accretions defined in appendix C, assuming normal operation of the airplane and its ice protection system in accordance with the operating limitations and operating procedures established by the applicant and provided in the Airplane Flight Manual.

\* \* \* \* \*

3. Amend § 25.107 by revising paragraph (e)(1)(iv) to read as follows:

**§ 25.107 Takeoff speeds.**

\* \* \* \* \*

(e) \* \* \*

(1) \* \* \*

(iv) A speed that, if the airplane is rotated at its maximum practicable rate, will result in a  $V_{LOF}$  of not less than –

(A) 110 percent of  $V_{MU}$  in the all-engines-operating condition, and 105 percent of  $V_{MU}$  determined at the thrust-to-weight ratio corresponding to the one-engine-inoperative condition; or

(B) If the  $V_{MU}$  attitude is limited by the geometry of the airplane (i.e., tail contact with the runway), 108 percent of  $V_{MU}$  in the all-engines-operating condition, and 104 percent of  $V_{MU}$  determined at the thrust-to-weight ratio corresponding to the one-engine-inoperative condition.

\* \* \* \* \*

4. Revise § 25.177 to read as follows:

**§ 25.177 Static lateral-directional stability.**

(a) The static directional stability (as shown by the tendency to recover from a skid with the rudder free) must be positive for any landing gear and flap position and symmetric power condition, at speeds from  $1.13 V_{SR1}$ , up to  $V_{FE}$ ,  $V_{LE}$ , or  $V_{FC}/M_{FC}$  (as appropriate for the airplane configuration).

(b) The static lateral stability (as shown by the tendency to raise the low wing in a sideslip with the aileron controls free) for any landing gear and flap position and symmetric power condition, may not be negative at any airspeed (except that speeds higher than  $V_{FE}$  need not be considered for flaps extended configurations nor speeds higher than  $V_{LE}$  for landing gear extended configurations) in the following airspeed ranges:

(1) From  $1.13 V_{SR1}$  to  $V_{MO} / M_{MO}$ .

(2) From  $V_{MO}/M_{MO}$  to  $V_{FC}/M_{FC}$ , unless the divergence is –

(i) Gradual;

(ii) Easily recognizable by the pilot; and

(iii) Easily controllable by the pilot.

(c) The following requirement must be met for the configurations and speed specified in paragraph (a) of this section. In straight, steady sideslips over the range of sideslip angles appropriate to the operation of the airplane, the aileron and rudder control movements and forces must be substantially proportional to the angle of sideslip in a stable sense. This factor of proportionality must lie between limits found necessary for safe operation. The range of sideslip angles evaluated must include those sideslip angles resulting from the lesser of:

(1) One-half of the available rudder control input; and

(2) A rudder control force of 180 pounds.

(d) For sideslip angles greater than those prescribed by paragraph (c) of this section, up to the angle at which full rudder control is used or a rudder control force of 180 pounds is obtained, the rudder control forces may not reverse, and increased rudder deflection must be needed for increased angles of sideslip. Compliance with this requirement must be shown using straight, steady sideslips, unless full lateral control input is achieved before reaching either full rudder control input or a rudder control force of 180 pounds; a straight, steady sideslip need not be maintained after achieving full lateral control input. This requirement must be met at all approved landing gear and flap positions for the range of operating speeds and power conditions appropriate to each landing gear and flap position with all engines operating.

5. Amend § 25.253 by adding paragraphs (a)(4) and (5) and revising paragraphs (b) and (c) introductory text to read as follows:

**§ 25.253 High-speed characteristics.**

(a) \* \* \*

(4) Adequate roll capability to assure a prompt recovery from a lateral upset condition must be available at any speed up to  $V_{DF}/M_{DF}$ .

(5) With the airplane trimmed at  $V_{MO}/M_{MO}$ , extension of the speedbrakes over the available range of movements of the pilot's control, at all speeds above  $V_{MO}/M_{MO}$ , but not so high that  $V_{DF}/M_{DF}$  would be exceeded during the maneuver, must not result in:

- (i) An excessive positive load factor when the pilot does not take action to counteract the effects of extension;
- (ii) Buffeting that would impair the pilot's ability to read the instruments or control the airplane for recovery; or
- (iii) A nose down pitching moment, unless it is small.

(b) Maximum speed for stability characteristics,  $V_{FC}/M_{FC}$ .  $V_{FC}/M_{FC}$  is the maximum speed at which the requirements of §§ 25.143(g), 25.147(f), 25.175(b)(1), 25.177(a) through (c), and 25.181 must be met with flaps and landing gear retracted. Except as noted in § 25.253(c),  $V_{FC}/M_{FC}$  may not be less than a speed midway between  $V_{MO}/M_{MO}$  and  $V_{DF}/M_{DF}$ , except that, for altitudes where Mach number is the limiting factor,  $M_{FC}$  need not exceed the Mach number at which effective speed warning occurs.

(c) Maximum speed for stability characteristics in icing conditions. The maximum speed for stability characteristics with the ice accretions defined in appendix C, at which the requirements of §§ 25.143(g), 25.147(f), 25.175(b)(1), 25.177(a) through (c), and 25.181 must be met, is the lower of:

\* \* \* \* \*

Issued in Washington, DC, on November 1, 2011.

J. Randolph Babbitt  
Administrator

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